

The Ideal and Combined Gas Laws Pre AP

Use your knowledge of the ideal and combined gas laws to solve the following problems. Hint: Figuring out which equation you need to use is the hard part! Use the following formulas to solve the next 20 questions. You will need to complete on a separate sheet of paper. Show all work including units or no credit may be given.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2} \quad \left[\frac{P_1 V_1}{n_1 T_1} = \frac{P_2 V_2}{n_2 T_2} \right] \quad PV = nRT \quad R = 0.0821 \frac{\text{atm} \cdot \text{L}}{\text{mol} \cdot \text{K}}$$

- 1) My car has an internal volume of 2600 L. If the sun heats my car from a temperature of 20° C to a temperature of 55 °C, what will the pressure inside my car be? Assume the pressure was initially 760 mmHg.
- 2) At what temperature (in Kelvin) would 4.0 moles of hydrogen gas in a 100 liter container exert a pressure of 1.00 atmospheres?
- 3) How many moles of oxygen must be placed in a 3.00 liter container in order to exert a pressure of 2.00 atmospheres at 25 °C?
- 4) How many moles of gas are in my car in problem #1?
- 5) If I have 7.7 moles of gas at a pressure of 0.09 atm and at a temperature of 56 °C, what is the volume of the container that the gas is in?
- 6) An 18 liter container holds 16.00 grams of oxygen gas (O₂) at 45 °C. What is the pressure in the container?
- 7) If I have 17 moles of gas at a temperature of 67 °C, and a volume of 88.89 L, what is the pressure of the gas?
- 8) If I have an unknown quantity of gas at a pressure of 0.5 atm, a volume of 25 L, and a temperature of 300 K, how many moles of gas do I have?

- 9) If I have 21 moles of gas held at a pressure of 78 atm and a temperature of 900 K, what is the volume of the gas?
- 10) A toy balloon filled with air has an internal pressure of 1.25 atm and a volume of 2.50 L. If I take the balloon to the bottom of the ocean where the pressure is 95 atm, what will the new volume of the balloon be? How many moles of gas does the balloon hold? (Assume $T = 285\text{ K}$)
- 11) What is the pressure exerted by 5.00 moles of nitrogen gas contained in a 30.0 Liter container at $25.0\text{ }^{\circ}\text{C}$?
- 12) If I have 2.4 moles of gas held at a temperature of $97\text{ }^{\circ}\text{C}$ and in a container with a volume of 45L, what is the pressure of the gas?
- 13) If I have an unknown quantity of gas held at a temperature of 1195 K in a container with a volume of 25 liters and a pressure of 560 atm, how many moles of gas do I have?
- 14) If I initially have a gas with a pressure of 84 kPa and a temperature of 35°C and I heat it an additional 230 degrees, what will the new pressure be? Assume the volume of the container is constant.
- 15) If I have 0.275 moles of gas at a temperature of 75 K and a pressure of 1.75 atm, what is the volume of the gas?
- 16) If I have 72L of gas held at a pressure of 3.4atm and a temperature of 225 K, how many moles of gas do I have?
- 17) 5.98 mL of an unknown gas weighs 0.081 g at STP. Calculate the molar mass of the gas. Can you determine the identity of this unknown gas? (Hint $\text{MM} = \text{g/mol}$ so find moles)
- 18) According to the reaction below, how many moles of CO_2 gas are formed?
$$\text{C}_4\text{H}_6(\text{g}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$$
- 19) If the CO_2 gas in questions #18 was collected at 30°C and 1atm, what volume of gas was collected?
- 20) How many moles of $\text{CO}_2(\text{g})$ is in a 5.6L sample of CO_2 measured at STP??